REMARKS

Claims 16-36 are pending.

Claim 12-32 were rejected under 35 USC 103(a) as being unpatentable over Ramdani, U.S. Patent 5,838,707. This rejection is respectfully traversed.

Applicants wish to point out that claims 16-36 are actually pending, and will assume that claims 12-32 noted in the Action correspond to claims 16-36 as they were presented in the Preliminary Amendment filed on January 17, 2002 and the Supplemental Preliminary Amendment filed on February 12, 2002. A copy of the claims is reproduced herein for the Examiner's reference.

Claim 16 recites "the active layer consists of two to four quantum well layers and one to three barrier layers each interposed between the quantum well layers, and the one or each barrier layer has a layer thickness of 4 nm or less." According to the specification, if two quantum well layers are provided in a multi-quantum-well structure active layer, injected electrons and holes are divided into the two quantum well layers, by which the densities of electrons and holes present per quantum well layer are reduced (pg. 8, line 20 to pg. 9, line 1). Thus, the distribution of electrons and holes in the momentum space is reduced. As a result, the tendency of saturation in the current vs. optical output power characteristic is corrected and a gallium nitride LED device with high brightness attributable to improved optical power is realized (pg. 9, lines 1-6). It is further recognized that if the barrier layer thickness is 4 nm or less, even if the quantum well layers are increased in number up to four, results similar to those described above can be obtained (pg. 9, lines 7-11). It has been discovered that even if three or four quantum well layers are provided, the wave function of electrons and holes can be overlapped between the quantum well layers by setting the thickness of the barrier layers to 4 nm or less (pg. 9, lines 22-25). It has also been found that by setting the thickness of the barrier layers to 4 nm or less, the problem of peak wavelength shift due to current injection is simultaneously solved (pg. 10, lines 1-3).

The Examiner asserts that Ramdani teaches that the barrier layers have a thickness of 4nm or less (citing col. 3, line 62 to col. 4, line 22). The portion of Ramdani referred to by the

Examiner is not related to the barrier layers at all. Ramdini only discloses the use of alternating quantum well layers and barrier layers at col. 5, lines 14-18. Furthermore, Ramdini fails to disclose or suggest any thickness of the barrier layers. Col. 3, line 62 to col. 4, line 22 is actually a discussion of layers which are not even a part of the active layer at all. Rather, col. 4, lines 5-7, discloses that the optical thickness of alternating layers 38, 39 is one quarter the wavelength of light 16, which is stated to be in the range of 350-550 nm. One quarter of 350 nm is 87.5 nm, which is not 4 nm or less. Furthermore, layers 22, 23, 38 and 39 are not the barrier layers, and are not located within the active layer 30. Thus, Ramdini fails to teach or suggest that the barrier layers have a thickness of less than 4 nm.

As discussed above, and in the specification, by limiting the thickness of the barrier layers to 4 nm or less, it is possible to increase the number of quantum well layers, and thus improve the quality of the device. As also discussed in the specification, it was previously known to use a barrier layer thickness of around 8 nm, which does not fall within the claimed range (see pg. 9, lines 11-19). Thus, since Ramdini fails to realize the advantages of the claimed thickness of the barrier layers, in other words fails to recognize that the thickness of the barrier layer is a result-effective variable, and the prior art devices use a thickness outside of the claimed range, it cannot be asserted that discovering the optimum or workable range would only involve routine skill. The fact is that Ramdini fails to discuss the thickness of the barrier layers at all, and thus obviously fails to realize the importance of this variable, as recognized by the present inventor. Thus, Ramdini fails to teach or suggest the features of claim 16.

Independent claims 22 and 26 all claim that the thickness of the barrier layer is 4 nm or less, and thus are allowable for the same reasons claim 16 is allowable.

Independent claim 34, which should correspond to claim 30 of the Examiner's listing, recites that "one of the first and second cladding layers is a p-type cladding layer, and the p-type cladding layer has a ridge portion and a planar portion on opposite sides of the ridge portion. The Examiner has failed to assert that this feature is shown anywhere in Ramdani. In fact, neither the first cladding layer 28 nor the second cladding layer 32, as shown in Fig. 1 of Ramdani, shown a

ridge portion and a planar portion on opposites ends of the ridge portion. Further, the description of these layers is completely silent with respect to this feature as well. Thus, the features of claim 34 are not taught or suggested by Ramdani.

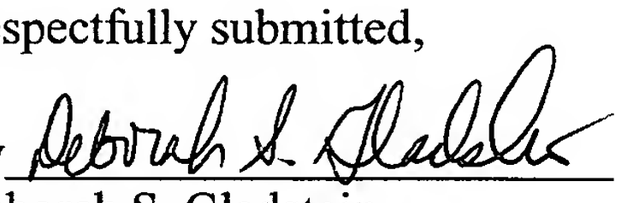
The remaining claims are allowable at least due to their respective dependencies. Applicant respectfully requests that this rejection be withdrawn.

In view of the above, each of the presently pending claims in this application is believed to be in immediate condition for allowance. Accordingly, the Examiner is respectfully requested to withdraw the outstanding rejection of the claims and to pass this application to issue. If it is determined that a telephone conference would expedite the prosecution of this application, the Examiner is invited to telephone the undersigned at the number given below.

In the event the U.S. Patent and Trademark office determines that an extension and/or other relief is required, applicant petitions for any required relief including extensions of time and authorizes the Commissioner to charge the cost of such petitions and/or other fees due in connection with the filing of this document to Deposit Account No. 03-1952 referencing docket no. 204552016410.

Dated: April 1, 2004

Respectfully submitted,

By 

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